



SDMS Doc ID 165950

United States  
Environmental Protection  
Agency

national exposure research laboratory

**Ecosystems Research Division**

## Processes and Modeling Branch Information

The Processes and Modeling Branch (PMB) conducts research to quantify biotic and abiotic transformation and transport (fate) processes, and to incorporate these processes into state-of-the-art multimedia and single medium modules to predict, with known certainty, exposure of humans and ecosystems to stressors.

Research emphasizes interactions of exposure processes at the spatial and temporal scales required to quantify stressor exposure to the affected systems. Chemical, enzymatic, and microbiological transformation processes are investigated and predictive models are developed for inorganics, organics, and organometallics. Speciation, sorption, and redox properties of metals and complex chemicals are identified, quantified, and described by equilibrium and kinetic sorption models. Predictive techniques that account for speciation and sorption, and that can be applied across all environmental media and conditions and across chemical types/mixtures, are incorporated into multimedia and single-medium exposure models.

Physics-based, process-driven models are developed for dynamic characterization of multimedia chemical, water quality, and land use stressors and system responses at watershed/regional and global scales. This process research has immediate application potential for site restoration technologies, and the exposure assessment models developed are directly applicable to ecosystem

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management/restoration strategy  
development of the design of risk  
reduction and risk management options.

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Last Updated 23 March 1999